

FY02 DDFA MIDYEAR REVIEW

Presented by

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Technology Assessment Program (TAP)

- Technology Information Management and Dissemination
- Deactivation and Decommissioning Technology Assessment Program
- Technology Assessment & Evaluation Facilities and Methodology Development

FU Collaborators: Marshall Allen (PM), Cindy Zhang, Lucero Bormey, Carmen Alicia Aponte



Project Relevance

Projects under this program support DOE **Closure Site Support** (EM -1 Thrust Area) by performing cost-effective technology evaluations.

- Coordinate technology assessments with end users (DOE sites)
 - Evaluate technologies in a standardized manner to provide comparable data on both baseline and innovative technologies
 - Focus on integrated demonstrations including characterization, decontamination, facility and equipment dismantlement, and waste management



Project Relevance (cont'd)

- Disseminate assessment data to DOE need holders/end users through written reports and the Internet: GET <http://dandd.org/>
- Develop improved technology assessment capabilities and mock up facilities that will directly relate to current D&D activities at DOE sites



Project Status

■ D&D Technology Assessments

- Twelve comprehensive D&D technology demonstrations, including NIKMT stripable coatings, will be performed in FY02.

■ Assessments Completed

- Conjet Robot 363: Hydrodemolition Concrete Ceiling
- Conjet Robot 363: Hydrodemolition Concrete Walls
- Hand Lance Open Blasting System (high pressure low flow rate): Concrete Coated Ceiling Decontamination
- Hand Lance Open Blasting System (high pressure low flow rate): Concrete Wall Decontamination (Scarification)
- Ultra Deckblaster Concrete Coated Floor Decontamination
- Mini-Scrubber: Coated Metal Plate Decontamination



Technology: Conjet Robot 363 Hydro-
demolition

Surface: Concrete Ceiling
Demolition



Data Collected

- Area: 390.20 ft^2 @ 14,000 psi, 62 gpm
- Total Length Cut: 273 ft (horizontal & vertical cuts)
- Thickness: 8 in
- Front Flange Thickness: 12 in
- Production Rate: 10.27 ft/hr or $6.85 \text{ ft}^2 \text{ /hr}$
- Cutting Rate: 113.28 ft/hr or $75.52 \text{ ft}^2 \text{ /hr}$



Technology: Conjet Robot 363 Hydro -demolition

Surface: Concrete Walls Demolition

Data Collected

- Area: 400 ft² @ 14,000 psi, 62 gpm
- Total Length Cut: 268 ft (horizontal cuts)
- Thickness: 8.5 in
- Production Rate: 6.34 ft/hr or 6.75 ft² /hr
- Cutting Rate: 48.91 ft/hr or 34.72 ft² /hr

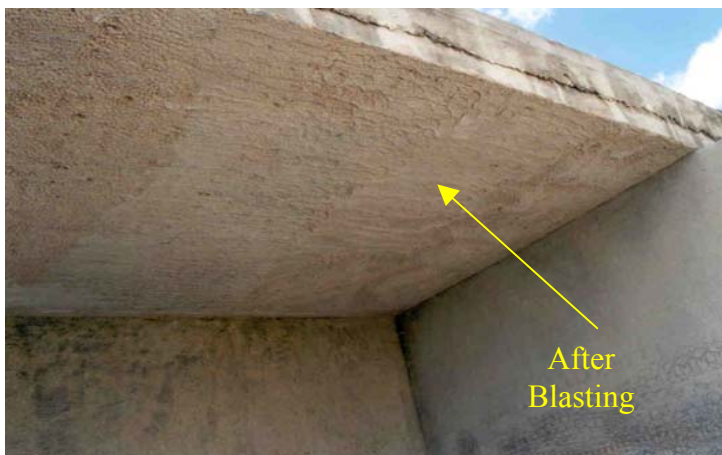


Hand Lance Open Blasting System Concrete Coated Ceiling Decontamination



Data Collected

- Area Blasted: 210.4 ft^2 @ $55,000 \text{ psi}$, 4.146 gpm
 - Production Rate: $2.14 \text{ ft}^2 / \text{min}$
 - Blasting Rate: $2.55 \text{ ft}^2 / \text{min}$
- Area Blasted: 135.4 ft^2 @ $36,000 \text{ psi}$, 3.932 gpm
 - Production Rate: $1.03 \text{ ft}^2 / \text{min}$
 - Blasting Rate: $2.35 \text{ ft}^2 / \text{min}$
 - High pressure low flow rate



Hand Lance Open Blasting System: Concrete Wall Decontamination (Scarification)

Data Collected

- Decontaminated Area :
185 ft² @ 36,000 psi,
3.932 gpm
 - Production Rate: 1.71 ft²
/min
 - Scarification Rate: 4.63
ft² /min
 - High pressure low flow
rate



Ultra Deckblaster Concrete Coated Floor Decontamination



Data Collected

- Area Blasted: 177.60 ft²
@ 55,000 psi, 4.146 gpm
 - Production Rate: 2.1 ft² /min
 - Blasting Rate: 22.2 ft² /min
- Area Blasted: 165.67 ft²
@ 36,000 psi, 3.932 gpm
 - Production Rate: 2.1 ft² /min
 - Blasting Rate: 5.92 ft² /min



Mini-Scrubber: Coated Metal Plate Decontamination

Data Collected

- Blasted Area : 53.76 ft² @ 40,000 psi, 4.2 gpm
 - Production Rate: 18.79 ft² /hr
 - Scarification Rate: 215.04 ft² /hr



Status

Technology Assessment & Evaluation Facilities and Methodology Development

- Assessment protocols and procedures from national technology evaluation programs were reviewed and a report drafted.
- A search for gamma imaging technologies for containerized waste was initiated for planned technology demonstration.



Project Status (cont'd)

Upcoming Planned Demonstrations:

- Demonstration of seven NIKMT stripable coatings (depends on U.S. arrival of Russian coatings)
- Two potential decontamination technologies (robotic)
- One potential globe box size reduction demonstration
- One potential gamma imaging technology demonstration



Status

Technology Information Management & Dissemination

- Information on 23 new technologies was entered into MIS.
- Information was extracted from 43 ITSRs and entered into the full-text searchable electronic library.
- Customer survey form for the GET website was created and sent to all users.
- Development of enhanced GET navigation was begun.



Project Status (cont'd)

- Compile GET customer service reports.
- Continue entering information from ITSRs and expand information in the technology information system (TIS) by 10%.
- Develop enhanced GET navigation.
- Retrieve repository information through wireless handheld devices.
- Make the GET information downloadable.



Project Status (cont'd)

- Design and fabricate gamma imaging technology test facility.
- Draft a guidance document for conducting technology assessment.
- Draft a training syllabus for student technology evaluators.



TAP Value Statement

- HCET technology assessment projects provide information on technology performance, cost, and worker health and safety that allows end users to easily compare technologies and identify potential benefits. HCET's Information Technology System (IT) contains and provides a number of databases on demonstrated technologies to end users. This information is available to end users via the Internet.



Technology Development, Integration and Deployment Program (TDID)

- Tool and Sensor Delivery Platform Research and Development
- Tool and Sensor Applied Research and Development
- Technology Deployment
- Long-Term Monitoring and Stewardship
- Aerosol Research, Development, and Modeling to Support D&D Operations

FU Collaborators: Leonel Lagos, John Laffite, Jose Varona, Sarkis Shahin



Project Relevance

- Projects under this program support DOE **Closure Site Support** (EM -1 Thrust Area) and **Alternative Approaches to Current High Cost/High Risk Baseline** (EM -1 Thrust 2) by developing cost-effective technology.
- Technology development and R&D efforts are geared toward worker dose reduction and schedule acceleration of D&D projects (especially at closure sites).
- Focus on integrated system and minimum new design resulting in cost-effective technologies with minimum R&D. Fast design and manufacturing process allows prototypes to be developed in short period of time, therefore **addressing closure sites needs in real time**.



Project Relevance (cont'd)

- Fast development of in-house mockup facilities to address a variety of DOE problem sets, so that prototypes can be developed and tested prior to deployment.



Project Status

Tool and Sensor Delivery Platform Research and Development

- U.S. DOE at Los Alamos National Laboratory currently has a need for the decontamination of hazardous materials that are packed in fiberglass-reinforced wooden crate boxes.
- To access the hazardous material, a system is needed to open the boxes and assist in the dismantlement operation. For this purpose, HCET is developing a Crate Size Reduction System.



Project Status (cont'd)

Problem Specification

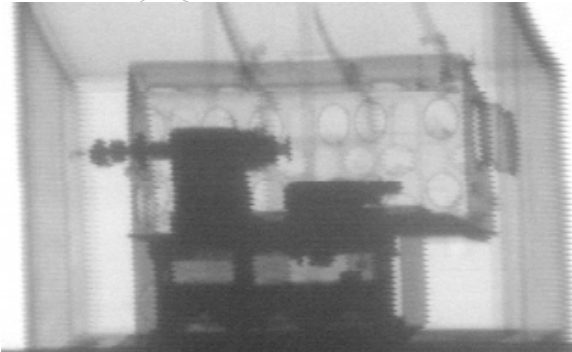
- LANL possesses between 500 and 800 fiberglass-reinforced plywood crates.
- A sampling of 54 boxes shows height variations of 2 to 13 feet, length variations of 6 to 24 feet, and width variations of 2 to 10.5 feet.
- Weight variations of 150 to 5,000 lbs with at least one crate weighing 12,000 lbs have been documented.
- Crates are nailed and glued together. There is a significant number of nails on each box.
- The crates are reinforced with fiberglass layers of non-uniform thickness.
- The boxes are relatively flat on the outside (no 2 x 4s outside the boxes).



Project Status (cont'd)



What's Inside?



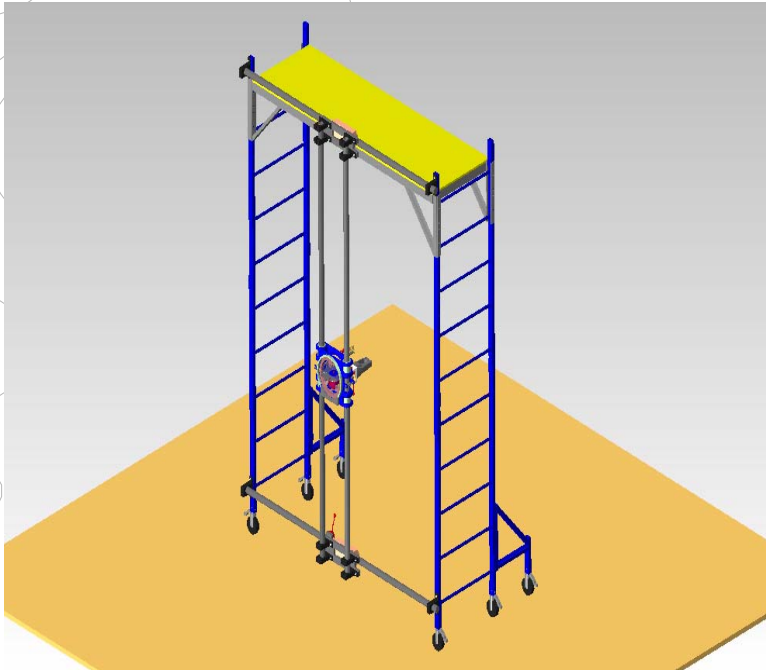
A glovebox with lathe



Trash



Project Status (cont'd)

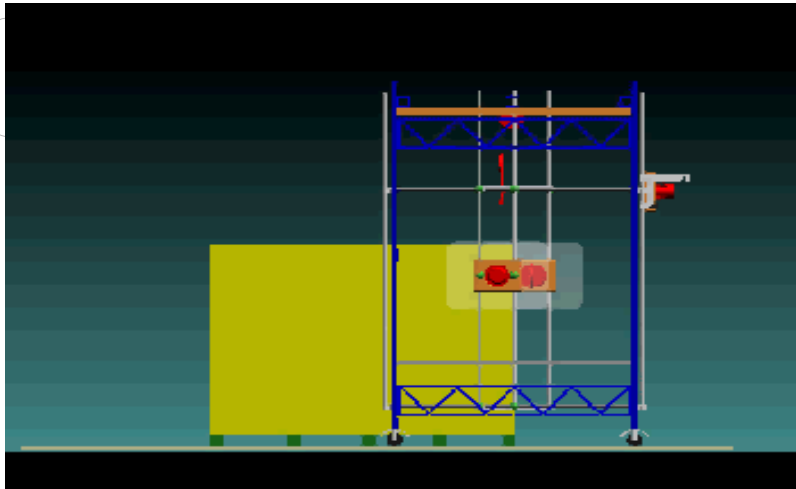


System Design: 60% completed

- Usable as a one-or two-platform system
- Cutting tool moves in/out forward boxes
- Max crate size 10'x10'x any length
- Dust collection
- Operator friendly



Project Status (cont'd)



Project Status

Tool and Sensor Applied Research and Development

- Development of a low-cost surveyor for contaminated environment.
- Applicable to DOE sites that must be surveyed periodically for various criteria including structural deterioration, water intrusion, integrity of storage containers, atmospheric conditions, and hazardous contaminated environments.



Project Status

HCET has developed a prototype Remote Harsh-Environment Surveyor (RHES) platform that is currently capable of

- Measuring radiation levels on the floor
- Transmitting the information via wireless modems to a remote station.



Project Status (cont'd)

RHES components:

- Linux-based PC104 computer system with data acquisition (Future version will use lower cost micro controllers.)
- Easily configurable to accommodate various sensors to allow more flexibility of use (temperature, humidity, alpha and beta radiation)
- High-resolution wireless color camera for navigation and inspection.
- Sonar-imaging scanner for obstacle avoidance and no-video navigation.
- Wireless RS232 modems for remote transmission data and command transmission.



Project Status (cont'd)

- Two rubberdifferentially controlled wheels and one free-moving wheel.
- Two 12-voltDC motors.
- Three 12-voltrechargeable batteries with up to 4 hours of run time.
- Estimated totalcost about\$3,500.



Radiation Sensor

RHES Control
and Com. Unit



Project Status

Technology Deployment

- Project addresses two specific areas:
 - Technology Deployment
 - Technology Support/Technical Assistance to DOE sites
- Deployment of HCET technologies throughout DOE and commercial utility complexes
- End users and project managers obtain accurate, up-to-date information on available technologies/approaches that could satisfy needs.



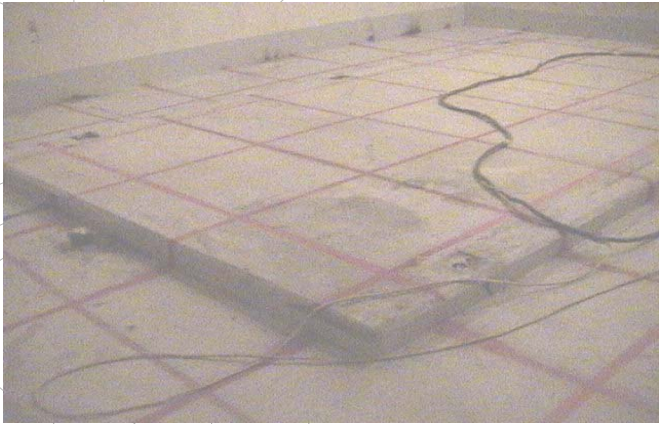
Project Status

Technology Deployment

- Deployment of HCET-developed Integrated Floor Decontamination and Characterization System (IFDCS)
- Site: Rancho Seco
- Problem Set: Radiologically contaminated concrete floor
- Status: 1000 sq feet of concrete floor were decontaminated to below detectable limits (<100 cpm /cm²)



Project Status (cont'd)



The pictures above show the room before decontamination



The pictures above show the room after decontamination



Project Status (cont'd)

- Technology Support/Technical Assistance
 - Evaluation of arc saw as feasible tool for reactor vessel cutting
 - Slag-free cutting
 - No mechanical coupling of forces between blade and workplace
 - Can cut up to a depth of $1/3$ blade diameter (20" & 36")
 - Site technical support
 - Cutting 3" thick Cast Steel plate (Rocky Flats)
 - Evaluation of Evolution 180 and Adamant tool for operation



Testing of Adamant Saw for Rocky Flats

- The Adamant is considered an innovative technology, making use of counter-rotating blades.
- No vibrations or kickback.
- Capable of cutting wood or metals like stainless steel, cast iron, etc.
- Lubricating device available for metal cutting.



Support (Cont'd)

- A demonstration was performed at HCET.
- The video shows the adamant saw making the cut on a 3" thick cast iron bar.

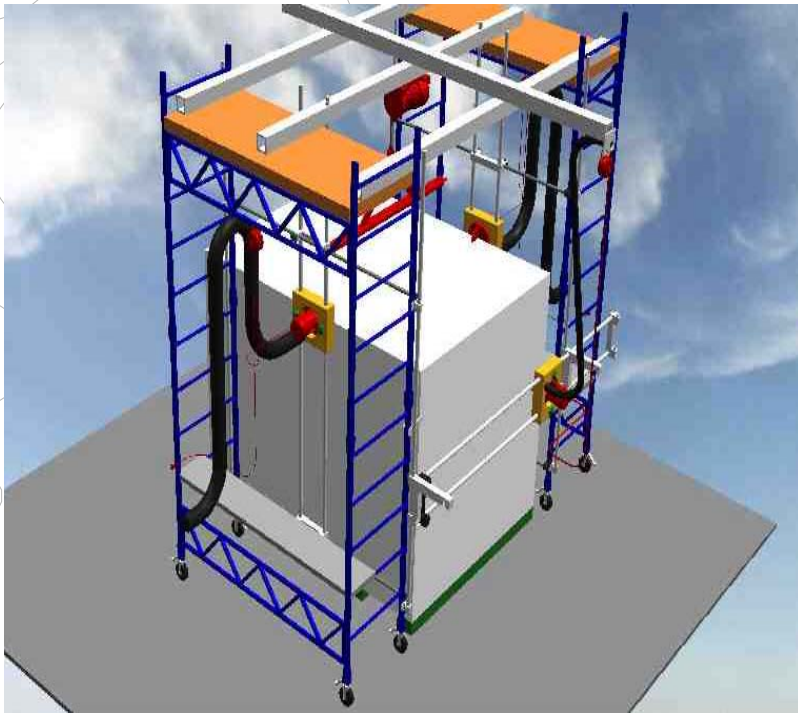
- Adamant 2739

- Specifications:

- Power 2300W Voltage/frequency 220-230V/50-60Hz
- Weight 7.2 kg
- Depth of cut 2.64" (with 9.25" saw blades)



Support (cont'd)



- Adam ant2739 chosen as the cutting tool. It rotates 90° to make horizontal and vertical cuts
- Two-platform system allows for cutting of the top of the boxes
- Power cord management
- Counter-weighted cutting tool
- Multiple cutting tools allow for multiple simultaneous cuts



Project Status

Long-Term Monitoring and Stewardship

- Development of a low-cost deployment platform and adaptation of surveillance and monitoring equipment
- Applicable to DOE sites that must be surveyed periodically for various criteria including structural deterioration, water intrusion, integrity of storage containers, atmospheric conditions, and hazardous contaminated environments.
- Automated system that can survey for contaminants and gather and report data remotely to a central station with limited human supervision.
- HCET has developed a mobile modular platform that can accommodate a continuous air monitoring sensor and transmit the information collected remotely via wireless modems to a central station.



Project Status (cont'd)

A standard filter is used that must be replaced each time data need to be collected. Air is drawn by a regulated pump through a 3-foot inlet hose and exhausted via a flow meter through another 3-foot hose. These may be extended to allow monitoring stacks, etc.

A tray for the filter is designed with two options:

- Manually pull-push the tray.
- Automatically open and close the tray by using an air cylinder.

Detector: 2" diameter thin window, thin crystal, scintillation detector
Model PG S 31

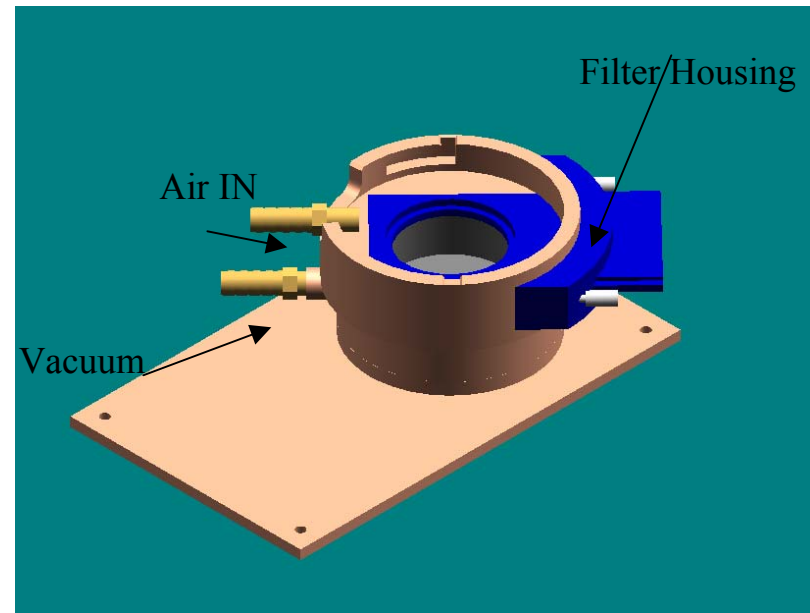
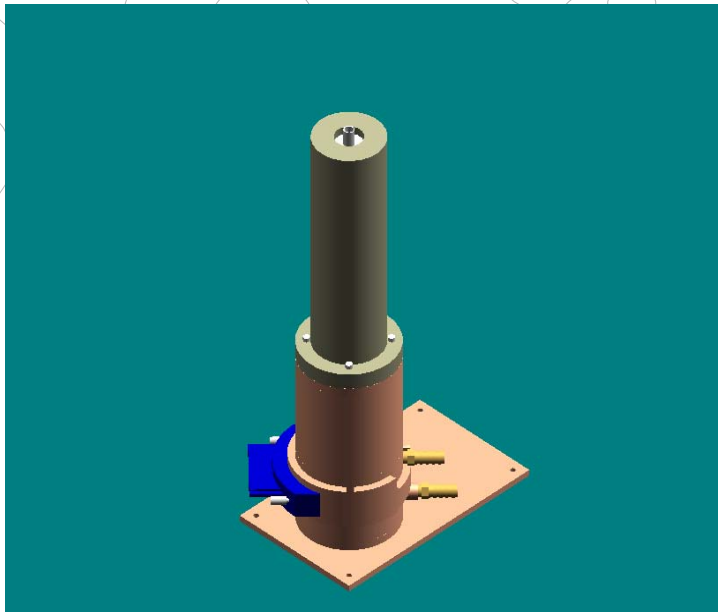
Filter: Free-flowing high retention filter paper 0.8 micron.

Pump: 12 vdc pump, flow rate range 10.2-13.3 LPM, vacuum range 0-19.4" Hg. Pressure range 0-18.3 psi



Project Status (cont'd)

- Filterhousing and air intake port design



Project Status

Aerosol Research, Development, and Modeling

to Support D&D Operations

■ Collecting air monitoring data

- Contacting site representatives, D&D operations managers, and D&D focus area project managers to obtain information from various sites regarding the D&D operations performed and their magnitude, characteristics of the generated airborne particulates (concentration, size distribution, etc.), and site topography and meteorological conditions.
- Reviewing technical literature and reports on such operations performed globally and continuing to compile the data as D&D operations are performed and use them for testing the models.



Project Status

- Review , test, and modify the existing models
 - Review various models used for predicting the fate and transport of pollutants in air. Models are used to study emissions from open dust sources, continuous release from industrial processes, sudden releases from sources, releases from unpaved roads, etc., and to determine inhalation exposures.
 - Test the existing models by using the data collected during D&D operations (obtained from DOE sites) to identify if they are applicable for D&D operations. Modify the screened models as necessary for use in D&D activities.



Project Status (cont'd)

- Information about existing models—screened various models, contacted vendors and collected relevant manuals and software of the screened models
- Search for data—in progress



TDID Value Statement

- HCET technology development integration and deployment projects develop prototype technologies based on real DOE needs. These technologies are designed to optimize performance, cost, and worker health and safety and allow end users to easily integrate these technologies as replacements for High-Cost/High-Risk baseline technologies.



TDID Value Statement (cont'd)

- TDID Program DOE site technical support allows DOE site project managers to obtain fast response on technology solutions and provides low-cost testing of technologies and/or tools with results typically obtained in a matter of days.



HCET Support Around the DOE Complex

- Los Alamos
- Mound
- Fermab
- NEEL
- West Valley



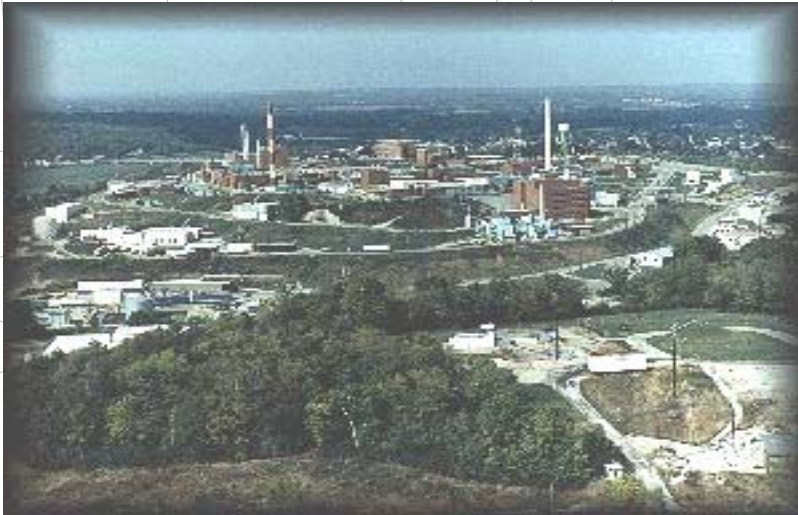
Large-Scale Demonstration & Deployment Project - Los Alamos



- Demonstrated improved technologies for the characterization, decontamination, segregation, volume reduction, packaging, and preparation of transuranic (TRU) waste currently in storage at Los Alamos.
- During 1999, provided technology assessment services at HCET testing facilities. Mega Tech cutting tool demonstrated
- Providing technical support to DOE's Los Alamos National Laboratory (LANL) and its industrial partners.
- Coordinates technology



Large-Scale Demonstration Project - Mound



- Demonstrated several innovative and improved technologies for the D&D of major tritium facilities at Mound.
- Identified technologies that may be specifically applicable to the D&D of the T Building and the R/SW Complex.
- Provided technical support to DOE's Mound Tritium Facilities and industrial partners during the completion of the LSDDP



Large-Scale Demonstration – Fernald Plant 1

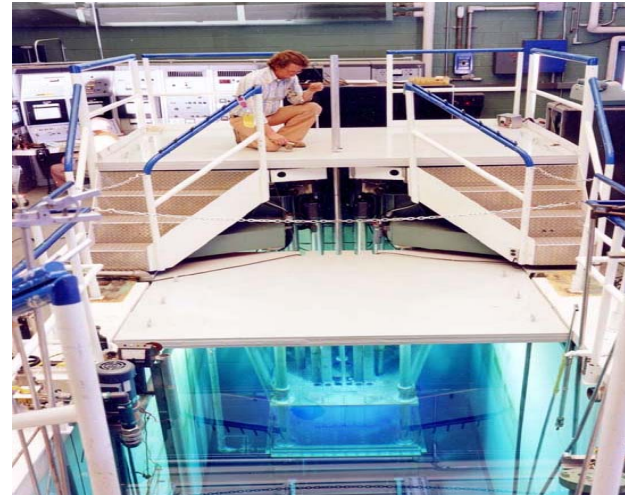


- Decommissioning of Plant 1 Complex at the Fernald Environmental Management Project.
- Collection of real-time data for D&D technologies and comparison of baseline & innovative technologies.
- Identified environmental technologies applicable to the Fernald site.
- Provided detailed technology assessments and participated in the technology screening.
- Provided Innovative Technology Summary Report



Large-Scale Demonstration – INEEL

- HCET participated in the last LSDDP at INEEL. HCET assisted in the search, screening, and selection of D&D technologies.
- HCET continues participation in the new batch of LSDDPs at INEEL.



Large-Scale Demonstration – West Valley

- HCET participates as an invited member of the West Valley LSDDP. HCET brings to the table an enormous amount of knowledge based on previous participation in all LSDDPs.
- HCET provides guidance to the ITC members.



Accelerated Site Technology Deployment Program

- Hemispheric Center for Environmental Technology (HCET), in cooperation with the Department of Energy (DOE) Oak Ridge Operations office, has conducted an ASTD for the deployment of the Arrow-Pak macro-encapsulation technology.
- Under the Accelerated Site Technology Deployment program, Arrow-Pak was funded as an innovative technology in the treatment of mixed waste debris.
- The material was audited to ensure compliance with the Envirocare Waste Acceptance Criteria and to ensure that the Waste Profile adequately described the hazardous and radioactive constituents in the waste.



Continuous DOE Sites Participation During Demonstrations at HCET



■ Glove Box and Tanks Size Reduction

- Rocky Flats representatives came to HCET test facilities to observe NUKEM-RASP demonstration.
- Actual Rocky Flats gloveboxes and annular tanks used during this demo.
- Additional Technologies Demonstrated: RedZone's Houdini Robotic Platform, FRAMATOME's cutting tools - air angle grinder, controlled power chipping hammer, plasma arc torch, & Hydraulic shears.



Continuous DOE Sites Participation During Demonstrations at HCET (Cont'd)



- Technology cutting "bake off"
 - LANL LSDDP provided two technicians to perform cutting operations. HCET SOW and testing protocols were followed.
 - HCET developed mockup crates and provided Perm aCon facilities and test engineers for data collection.
 - Cutting tool tested: Reciprocating saw (Dewalt) & Circular Saw



Continuous DOE Sites Participation During TAP Demonstrations (Cont'd)



- Cutting Tools tested
 - AdamantSaw (Twin Blades), Evolution 180, & Portercable Saw w/Vacuum System

